



Docket No. 98-0219.01
WD # 370195

Micron Ref. No. 98-0219.01

Clean Version of Pending Claims

METHOD FOR ATTACHING A SEMICONDUCTOR DIE TO A SUBSTRATE

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Serial No.: 09/649,827

Claims 34-60 and 62-63 as of October 18, 2002 (date Response to Office Action filed).

F 34.) (Twice Amended) A method of attaching a semiconductor die to an organic support structure, comprising:

selecting a two-sided adhesive tape having a polyimide carrier layer positioned between a first adhesive layer and a second adhesive layer; the first and second adhesive layers each comprising a hybrid material of thermoplastic and thermosetting adhesive;

affixing the first adhesive layer to a surface of the organic support structure; and

affixing a face of the semiconductor die to the second adhesive layer of the adhesive tape.

35.) (Twice Amended) A method of attaching a semiconductor die to an organic support structure, comprising:

affixing a first adhesive layer mounted on one side of a polyimide carrier layer to a surface of the organic support structure, wherein the first adhesive layer is Carboxyl Terminated Acrylonitrile Butadiene modified epoxy resin; and

affixing a face of the semiconductor die to a second adhesive layer mounted on an opposing side of the polyimide carrier layer, wherein the second adhesive layer is a Carboxyl Terminated Acrylonitrile Butadiene modified epoxy resin.

Sub 36.) (Twice Amended) A method of attaching a semiconductor die to an organic support structure, comprising:

affixing a first adhesive layer mounted on one side of a polyimide carrier layer to a surface of the organic support structure, wherein the first adhesive layer is a hybrid material including thermoplastic and thermoset material; and

affixing a face of the semiconductor die to a second adhesive layer mounted on an

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opposing side of the carrier layer, wherein the second adhesive layer is a hybrid material including thermoplastic and thermoset material.

37.) (Twice Amended) A method of attaching a semiconductor die to an organic support structure, comprising:

affixing a first adhesive layer mounted on one side of a polyimide carrier layer to a surface of the organic support structure, wherein the first adhesive layer is a Carboxyl Terminated Acrylonitrile Butadiene modified epoxy resin; and

affixing a face of the semiconductor die to a second adhesive layer mounted on an opposing side of the polyimide carrier layer, wherein the second adhesive layer is a Carboxyl Terminated Acrylonitrile Butadiene modified epoxy resin.

38.) (Twice Amended) A method of attaching a semiconductor die to an organic support structure, comprising:

affixing a first adhesive layer mounted on one side of a polyimide carrier layer to a surface of the organic support structure, wherein the first adhesive layer is a hybrid material including thermoplastic and thermoset material, the first adhesive layer having a thickness of .0005 inches, and the carrier layer having a thickness of .002 inches; and

affixing a face of the semiconductor die to a second adhesive layer mounted on an opposing side of the polyimide carrier layer, wherein the second adhesive layer is a hybrid material including thermoplastic and thermoset material, the second adhesive layer having a thickness of .0005 inches.

39.) (Fourth Amended) A method of attaching a semiconductor die to an organic support structure, comprising:

contacting a first adhesive layer mounted on one side of a polyimide carrier layer to a

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surface of the organic support structure, wherein the first adhesive layer comprises a hybrid material of thermoplastic and thermosetting adhesive;

elevating the temperature to 100 degrees C to activate the first adhesive layer;

applying pressure to the first adhesive layer and organic support structure to laminate the first adhesive layer to the organic support structure;

contacting a face of the semiconductor die to a second adhesive layer mounted on an opposing side of the carrier layer, wherein the second adhesive layer comprises a hybrid material of thermoplastic and thermosetting adhesive;

elevating the temperature of the second adhesive layer to activate the second adhesive layer; and

applying pressure to the die and organic support structure to laminate the second adhesive layer to the die.

40.) The method of claim 39 further comprising electrically connecting a plurality of bond pads on the die face with a plurality of lead connections on the organic support structure.

41.) The method of claim 40 wherein electrically connecting the bond pads to the lead connections comprises wire bonding bond wires to the bond pads and the lead connections.

42.) The method of claim 41 further comprising forming an encapsulating material around portions of the die and organic support structure.

43.) (Amended) The method of claim 42 wherein the hybrid material in the first and second adhesive layers is a Carboxyl Terminated Acrylonitrile Butadiene modified epoxy resin.

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44.) (Fourth Amended) A method of attaching a semiconductor die to an organic support structure, comprising:

contacting a first adhesive layer mounted on one side of a polyimide carrier layer to a surface of the organic support structure, wherein the first adhesive layer comprises a hybrid material of thermoplastic and thermosetting adhesive;

elevating the temperature of the first adhesive layer to activate the first adhesive layer;

applying pressure to the first adhesive layer and organic support structure to laminate the first adhesive layer to the organic support structure, wherein elevating the temperature and applying pressure occurs for 100ms;

contacting a face of the semiconductor die to a second adhesive layer mounted on an opposing side of the polyimide carrier layer, wherein the second adhesive layer comprises a hybrid material of thermoplastic and thermosetting adhesive;

elevating the temperature of the second adhesive layer activate the second adhesive layer;

applying pressure to the die and organic support structure to laminate the second adhesive layer to the die;

wire bonding bond wires to a plurality of bond pads on the die face with a plurality of lead connections on the organic support structure;

applying an encapsulating material over the bond pads, bond wires, lead connections, and a portion of the die face and support structure.

45.) The method of claim 44 wherein the encapsulating material comprises a curable glob-top formed by dispensing a viscous curable material.

46.) The method of claim 45 further comprising curing the encapsulating material.

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47.) The method of claim 46 further comprising inverting the organic support structure and applying a second curable glob-top to a perimeter of a back side of the semiconductor die.

48.) (Amended) The method of claim 44, wherein the hybrid material in the first and second adhesive layers is a Carboxyl Terminated Acrylonitrile Butadiene modified epoxy resin.

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49.) The method of claim 48 further comprising trimming the organic support structure to form a BGA package.

50.) The method of claim 49 further comprising electrically interconnecting the BGA package to a receiving component.

51.) (Twice Amended) A method for fabricating a semiconductor package comprising:

providing a semiconductor die having a face and a plurality of bond pads;

providing an organic support structure comprising a die attach area and a plurality of lead connections;

providing an adhesive tape that includes a polyimide carrier layer between a first adhesive layer and a second adhesive layer, wherein the first adhesive layer and the second adhesive layer each include a Carboxyl Terminated Acrylonitrile Butadiene modified epoxy resin [adhesive tape has a lamination temperature of about ambient temperature]; and

attaching the first adhesive layer to the die attach area of the organic support structure and the second adhesive layer to the die face.

52.) The method of claim 51 further comprising applying low heat to laminate the tape to the die and the organic support structure.

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#167 53.) The method of claim 52 further comprising applying pressure to laminate the tape to the die and the organic support structure.

54.) The method of claim 53 further comprising electrically connecting the bond pads to the lead connections.

55.) The method of claim 54 wherein the electrical connection comprises connecting a series of bond wires to the bond pads and to the lead connections.

56.) The method of claim 55 further comprising applying a viscous material to cover the bond pads, lead connections, bond wires, and a portion of the organic support structure.

57.) The method of claim 56 wherein the viscous material is a curable glob-top.

58.) The method of claim 34 further comprising applying pressure and 100 degrees C to the tape for 100ms and laminating the tape to the support structure.

59.) The method of claim 34 further comprising laminating the tape to the organic support structure at ambient temperature.

60.) The method of claim 34 further comprising laminating the tape to the organic support structure at 100 degrees C or less.

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Canceled 61.) The method of claim 34 wherein the adhesive tape comprises Carboxyl Terminated Acrylonitrile Butadiene modified epoxy resin.

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62.) (Twice Amended) The method of claim 34 wherein the first and second adhesive layers are approximately .0005 inches in thickness.

63.) (Thrice Amended) The method of claim 34 wherein the polyimide carrier layer has a thickness of .002 inches.